

APPENDIX J  
APPENDIX K  
APPENDIX A  
APPENDIX B  
APPENDIX C  
APPENDIX D  
**APPENDIX E**

## Environmental Justice

TA-18

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## APPENDIX E

### ENVIRONMENTAL JUSTICE

#### E.1 INTRODUCTION

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 FR 7629), directs Federal agencies to identify and address, as appropriate, disproportionately high and adverse health or environmental effects of their programs, policies, and activities on minority populations and low-income populations.

The Council on Environmental Quality (CEQ) has oversight responsibility for documentation prepared in compliance with the National Environmental Policy Act (NEPA). In December 1997, the Council released its guidance on environmental justice under NEPA (CEQ 1997). The Council's guidance was adopted as the basis for the analysis of environmental justice contained in this *Environmental Impact Statement for the Proposed Relocation of Technical Area 18 Capabilities and Materials at the Los Alamos National Laboratory (TA-18 Relocation EIS)*.

This appendix provides an assessment of the potential for disproportionately high and adverse human health or environmental effects on minority and low-income populations resulting from the implementation of the alternatives described in Chapter 3 of the *TA-18 Relocation EIS*. The *TA-18 Relocation EIS* was prepared during a time when the U.S. Bureau of the Census is analyzing and publishing results of the decennial census conducted in 2000 (hereafter referred to as Census 2000). As discussed below, Census 2000 data were included in this analysis based on availability at the time of publication. Results and projections from the 1990 Census were used to fill gaps in available demographic data.

#### E.2 DEFINITIONS

##### Minority Individuals and Populations

The following definitions of minority individuals and population were used in this analysis of environmental justice:

- **Minority individuals**—Individuals who are members of the following population groups: Hispanic or Latino, American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, or two or more races. This definition is similar to that given in the CEQ environmental justice guidance (CEQ 1997), except that it has been modified to reflect *Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity* (62 FR 58782) and recent guidance (OMB 2000) published by the Office of Budget and Management. These revisions were adopted and used by the Bureau of the Census in collecting data for Census 2000. When data from the 1990 Census are used, a minority individual will be defined as someone self-identified as: Hispanic; American Indian, Eskimo, or Aleut; Asian or Pacific Islander; or Black. As discussed below, racial and ethnic data from the 1990 Census cannot be directly compared with that from Census 2000.

The Office of Management and Budget has also recommended that persons self-identified as multiracial should be counted as a minority individual if one of the races is a minority race (OMB 2000). During Census 2000, approximately 2 percent of the population identified themselves as members of more than one race (DOC 2001). Approximately two-thirds of those designated themselves as members of at least

one minority race. For the purposes of evaluation in this environmental impact statement (EIS), where more detailed data is not available, persons designating themselves as members of more than one race were included in the minority population. This will tend to overestimate the minority population, but the uncertainties are small and would not affect the conclusions regarding environmental justice.

- **Minority population**—Minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. In identifying minority communities, agencies may consider as a community either a group of individuals living in geographic proximity to one another, or a geographically dispersed and transient set of individuals (such as migrant workers or American Indians/Alaska Natives), where either type of group experiences common conditions of environmental exposure or effect. The selection of the appropriate unit of geographic analysis may be a governing body's jurisdiction, a neighborhood, census tract, or other similar unit that is to be chosen so as to not artificially dilute or inflate the affected minority population. A minority population also exists if there is more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above-stated thresholds.

In the discussions of environmental justice in this EIS, persons self-designated as Hispanic or Latino are included in the Hispanic or Latino population, regardless of race. For example, the Asian population is composed of persons self-designated as Asian and not of Hispanic or Latino origin. Asians who designated themselves as having Hispanic or Latino origins are included in the Hispanic or Latino population. Data for the analysis of minority populations in 1990 were extracted from Table P012 of Summary Tape File 3 (DOC 1992). Census 2000 data were obtained from the Census Bureau's website at address [www.census.gov](http://www.census.gov).

### Low-Income Populations and Individuals

Executive Order 12898 specifically addresses "disproportionately high and adverse effects" on "low-income" populations. The CEQ recommends that poverty thresholds be used to identify "low-income" individuals (CEQ 1997).

The following definition of low-income population was used in this analysis:

- **Low-income population**—Low-income populations in an affected area should be identified with the annual statistical poverty thresholds from the U.S. Bureau of the Census' *Current Population Reports, Series P-60 on Income and Poverty*. In identifying low-income populations, agencies may consider as a community either a group of individuals living in geographic proximity to one another, or a set of individuals (such as migrant workers or American Indians/Alaska Natives), where either type of group experiences common conditions of environmental exposure or effect (CEQ 1997).

Data for the analysis of low-income populations were extracted from Table P121 of Summary Tape File 3 (DOC 1992). Detailed income data resulting from Census 2000 is not yet available. It will be incorporated into the *Final TA-18 Relocation EIS* if it becomes available prior to publication of the Final EIS.

### Disproportionately High and Adverse Human Health Effects

Adverse health effects are measured in risks and rates that could result in latent cancer fatalities, as well as other fatal or nonfatal adverse impacts to human health. Disproportionately high and adverse human health effects occur when the risk or rate of exposure to an environmental hazard for a minority population or

low-income population is significant and exceeds the risk of exposure rate for the general population or for another appropriate comparison group (CEQ 1997).

### **Disproportionately High and Adverse Human Environmental Effects**

A disproportionately high environmental impact refers to an impact or risk of an impact in a low-income or minority community that is significant and exceeds the environmental impact on the larger community. An adverse environmental impact is an impact that is determined to be both harmful and significant. In assessing cultural and aesthetic environmental impacts, impacts that uniquely affect geographically dislocated or dispersed or minority low-income populations are considered (CEQ 1997).

Potentially affected areas examined in this EIS include areas defined by an 80-kilometer (50-mile) radius centered on candidate facilities for TA-18 activities. As discussed in Chapter 3, candidate sites include Los Alamos National Laboratory (LANL), Sandia National Laboratories/New Mexico (SNL/NM), Nevada Test Site (NTS), and Argonne National Laboratory-West (ANL-W) at the Idaho National Engineering and Environmental Laboratory. Potentially affected areas used in the analysis of environmental justice are the same as those used in the analysis of radiological health effects described in Chapter 5.

## **E.3 METHODOLOGY**

### **E.3.1 Spatial Resolution**

For the purposes of enumeration and analysis, the Census Bureau has defined a variety of areal units (DOC 1992). Areal units of concern in this document include (in order of increasing spatial resolution) states, counties, census tracts, block groups, and blocks. The “block” is the smallest of these entities and offers the finest spatial resolution. This term refers to a relatively small geographical area bounded on all sides by visible features such as streets and streams or by invisible boundaries such as city limits and property lines. During the 1990 census, the Census Bureau subdivided the United States and its territories into 7,017,425 blocks. For comparison, the number of counties, census tracts, and block groups used in the 1990 census were 3,248; 62,276; and 229,192; respectively. While blocks offer the finest spatial resolution, economic data required for the identification of low-income populations are not available at the block-level of spatial resolution. In the analysis below, block groups are used throughout as the areal unit. Block groups generally contain between 250 and 500 housing units (DOC 1992).

During the decennial census, the Census Bureau collects data from individuals and aggregates the data according to residence in a geographical area, such as a county or block group. This EIS uses data from the 1990 census as a baseline for calculations performed with block group level spatial resolution. The Census Bureau has not yet published block group level results of the 2000 census. The data are scheduled for publication in mid-2002.

Boundaries of the areal units are selected to coincide with features such as streams and roads or political boundaries such as county and city borders. Boundaries used for aggregation of the census data usually do not coincide with boundaries used in the calculation of health effects. As discussed in Chapter 5, radiological health effects due to an accident at each of the sites considered for the proposed actions are evaluated for persons residing within a distance of 80 kilometers (50 miles) of an accident site. In general, the boundary of the circle with an 80-kilometer (50-mile) radius centered at the accident site will not coincide with boundaries used by the Census Bureau for enumeration of the population in the potentially affected area. Some block groups lie completely inside or outside of the radius for health effects calculation. However, other block groups are only partially included. As a result of these partial inclusions, uncertainties are introduced into the estimate of the population at risk from the accident.

To estimate the populations at risk in partially included block groups, it was assumed that populations are uniformly distributed throughout the area of each block group. For example, if 30 percent of the area of a block group lies within 80 kilometers (50 miles) of the accident site, it was assumed that 30 percent of the population residing in that block group would be at risk.

### E.3.2 Population Projections

Health effects were calculated for populations projected to reside in potentially affected areas during the year 2001. Extrapolations of the total population for individual states are available from both the Census Bureau and various state agencies (Campbell 1996). The Census Bureau also projects populations by ethnic and racial classification in one-year intervals for the years from 1995 to 2025 at the state level (Campbell 1997). State agencies project total populations for individual counties. No Federal or state agency projects block group or low-income populations. Data used to project minority populations were extracted from the Census Bureau's World Wide Web site at address [www.census.gov](http://www.census.gov). To project minority populations in potentially affected areas, minority populations determined from the 1990 census data were taken as a baseline for each block group. Then it was assumed that percentage changes in the minority population of each block group for a given year (compared to the 1990 baseline data) will be the same as percentage changes in the state minority population projected for the same year. An advantage to this assumption is that the projected populations are obtained using a consistent method, regardless of the state and associated block group involved in the calculation. A disadvantage is that the method is insensitive to localized demographic changes that could alter the projection in a specific area.

The Census Bureau uses the cohort-component method to estimate future populations for each state (Campbell 1996). The set of cohorts is comprised of: (1) age groups from one year or less to 85 years or more, (2) male and female populations in each age group, and (3) the following racial and ethnic groups in each age group: Hispanic, non-Hispanic Asian, non-Hispanic Black, non-Hispanic Native American, and non-Hispanic White. Racial and ethnic groups will change in the projections based on Census 2000 data. Components of the population change used in the demographic accounting system are births, deaths, net state-to-state migration, and net international migration. If  $P(t)$  denotes the number of individuals in a given cohort at time "t," then:

$$P(t) = P(t_0) + B - D + DIM - DOM + IIM - IOM$$

where:

$P(t_0)$	=	Cohort population at time $t_0 \leq t$ . For this analysis, $t_0$ denotes the year 1990.
$B$	=	Births expected during the period from $t_0$ to $t$ .
$D$	=	Deaths expected during the period from $t_0$ to $t$ .
$DIM$	=	Domestic migration into the state expected during the period from $t_0$ to $t$ .
$DOM$	=	Domestic migration out of the state expected during the period from $t_0$ to $t$ .
$IIM$	=	International migration into the state expected during the period from $t_0$ to $t$ .
$IOM$	=	International migration out of the state expected during the period from $t_0$ to $t$ .

Estimated values for the components shown on the right side of the equation are based on past data and various assumptions regarding changes in the rates for birth, mortality, and migration (Campbell 1996). It should be noted that the Census Bureau does not project populations of individuals who identified themselves as "other race" during the 1990 census. This population group is less than 2 percent of the total population in each of the states. However, to project total populations in the environmental justice analysis, population projections for the "other race" group were made under the assumption that the growth rate for the "other race" population will be identical to the growth rate for the combined minority and white populations.

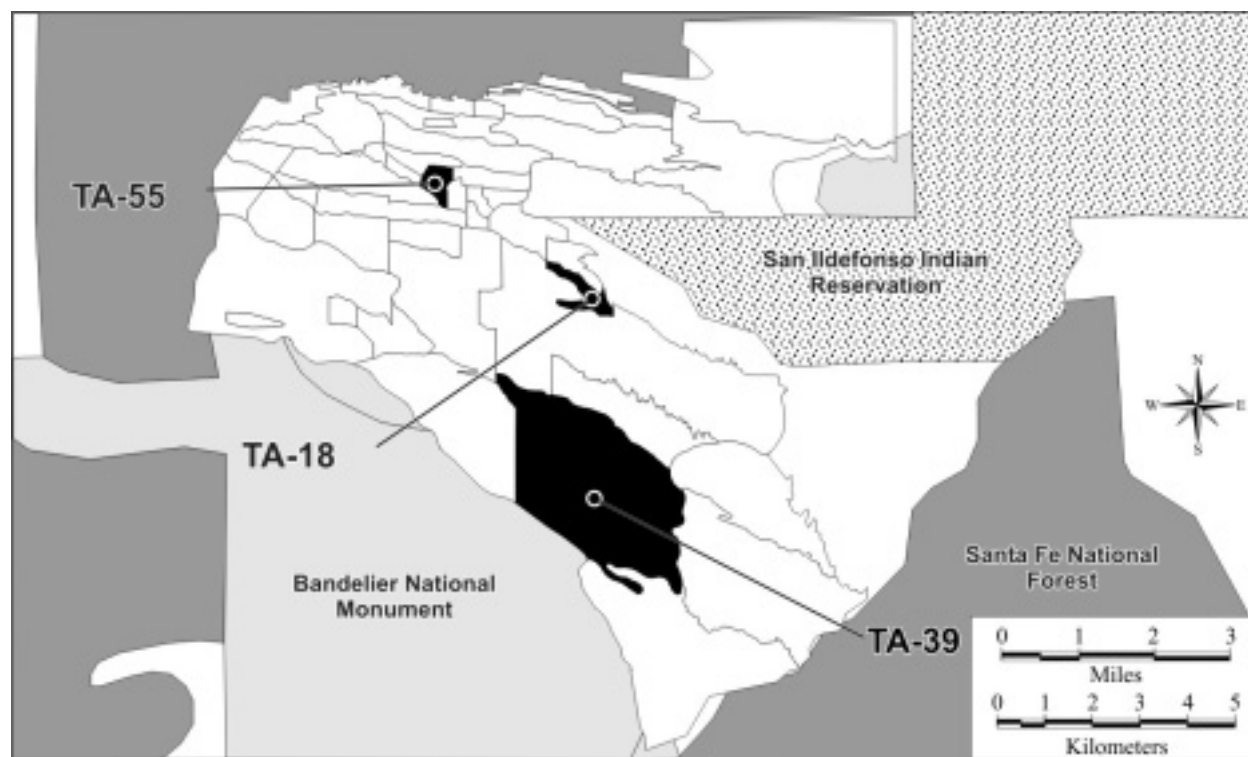
## E.4 ENVIRONMENTAL JUSTICE ANALYSIS

The analysis of environmental justice concerns was based on an assessment of the impacts reported in Chapter 5. This analysis was performed to identify any disproportionately high and adverse human health or environmental impacts on minority or low-income populations surrounding the candidate sites. Demographic information obtained from the Census Bureau was used to identify the minority populations and low-income communities in the zone of potential impact surrounding the sites (DOC 1992 and [www.census.gov](http://www.census.gov)). Data from Census 2000 were used to identify minority populations at risk in potentially affected counties. Census 1990 data projected to the year 2001 were used for detailed calculations.

## E.5 RESULTS FOR THE CANDIDATE SITES

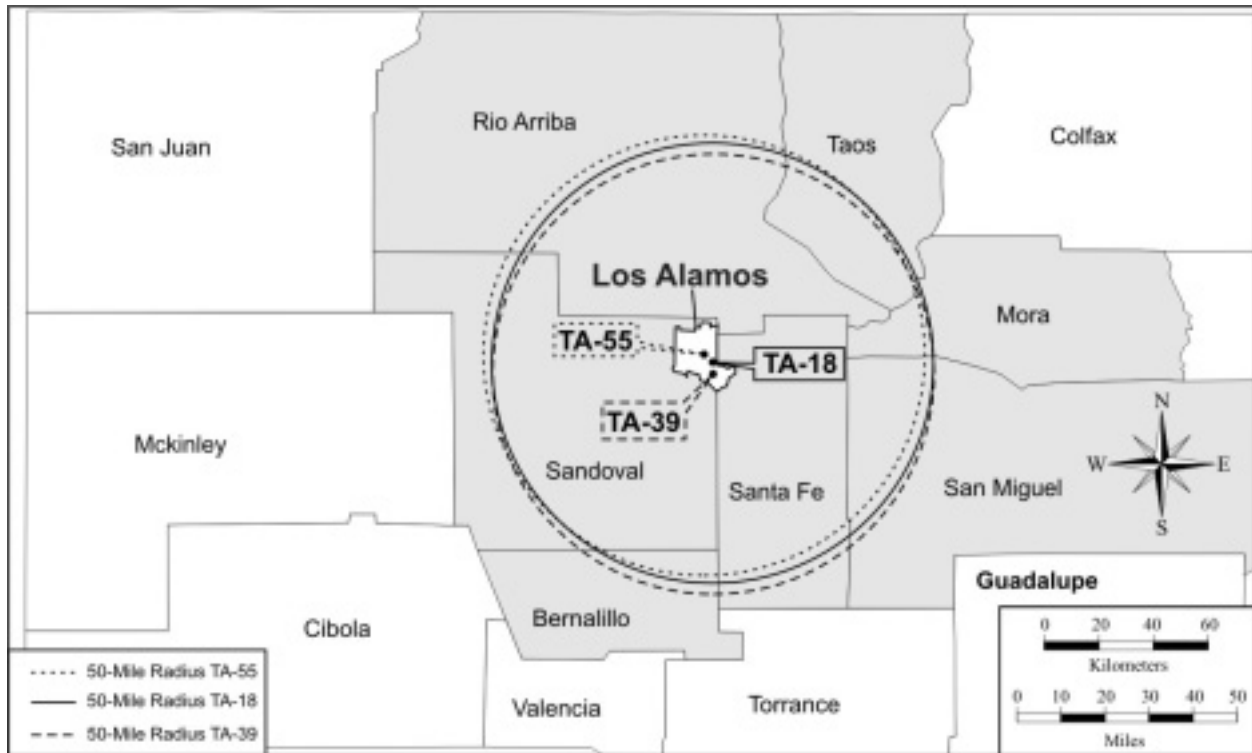
### E.5.1 Los Alamos National Laboratory (LANL)

As discussed in Chapter 3, three technical areas at LANL are associated with the relocation of TA-18 mission activities (see **Figure E-1**): 1) TA-18, the current location, 2) TA-55, candidate for relocation of TA-18 mission activities except SHEBA activities, and 3) TA-39, candidate for relocation of SHEBA activities.



**Figure E-1 Candidate Technical Areas at LANL**

**Figure E-2** and **Table E-1** show the counties at radiological risk and the composition of the population of these counties, respectively. The Counties are: Bernalillo, Los Alamos, Mora, Rio Arriba, Sandoval, San Miguel, Santa Fe, and Taos. As indicated in Figure E-2, circles of 80 kilometers (50 miles) radius centered at the three candidate technical areas all contain or intersect the same nine counties. The total population at risk from the SHEBA mission at TA-39 would be the largest of the three populations at risk because TA-39 is closest to Bernalillo County.



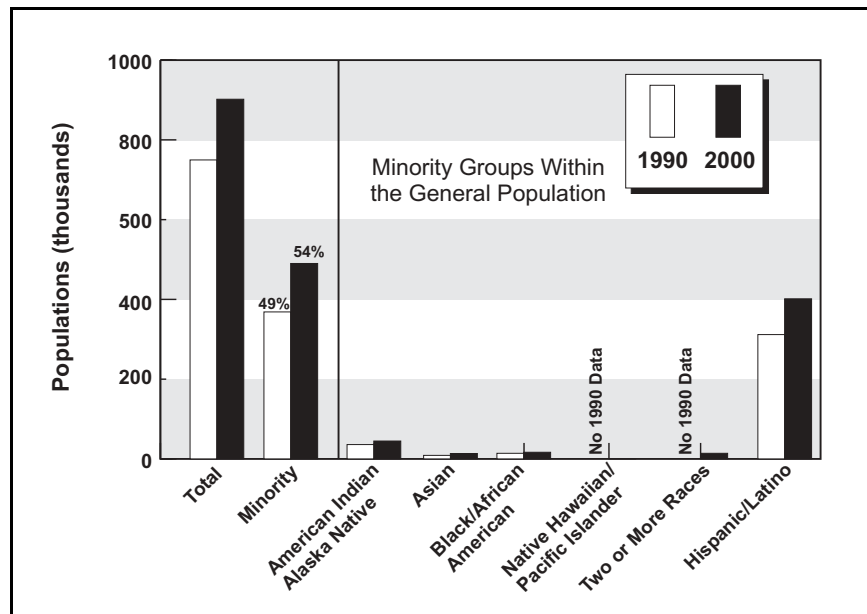
**Figure E-2 Potentially Affected Counties near LANL**

**Table E-1 Populations in Potentially Affected Counties Surrounding LANL in 2000**

<i>Population Group</i>	<i>Population</i>	<i>Percentage of Total</i>
Total	900,696	100.0
Minority	488,850	54.3
Hispanic/Latino	400,673	44.5
Black/African American	16,204	1.8
American Indian/Alaska Native	44,430	4.9
Asian	13,195	1.5
Native Hawaiian/Pacific Islander	607	0.1
Two or more races	13,741	1.5
Some other race	1,498	0.2
White	410,348	45.6

Data shown in Table E-1 reflect the results of Census 2000. The Hispanic or Latino population shown in Table E-1 includes persons of any race who designated themselves as having Hispanic or Latino origins. Populations for each race shown in the last seven rows of Table E-1 did not characterize themselves as having Hispanic or Latino origins. As discussed in Section E.2 above, persons indicating that they were multiracial are included in the estimate of the minority population given in the second row of the table. Approximately two percent of the total U.S. population selected two or more races during Census 2000. Of those, approximately one-third selected “White” and “Some other race.” Since “White” and “Other race” are not included in the CEQ current definition of minority races (CEQ 1997), the minority population shown in Table E-1 is overestimated. However, since non-Hispanic persons in the group “Two or more races” were less than two percent of the total population of these counties in 2000, the overestimate is relatively small.

**Figure E-3** compares Census 2000 data with that for 1990 (to the extent that the data can be compared). There are several reasons that minority data from Census 1990 cannot be directly compared with Census 2000 data. During the 1990 Census, Asian and Pacific Islanders were counted together in a single category. However, during Census 2000, “Native Hawaiian and Other Pacific Islander” and “Asian” were separate responses (selection of either one or both was an option). As a result, the 1990 population composed of Native Hawaiian and Other Pacific Islanders cannot be



**Figure E-3 Comparison of County Populations near LANL in 1990 and 2000**

identified as a population distinct from Asians. In addition, during the 1990 Census, respondents were asked to designate themselves as members of only a single race. During Census 2000, respondents could select any combination of all of the six single race categories. As indicated in Figure E-3, there is no multiracial data available from the 1990 Census.

Bearing in mind the changes in racial categories and enumeration that occurred between the 1990 Census and Census 2000, the following approximate comparison can be made. In the decade from 1990 to 2000, the minority population in potentially affected counties increased from approximately 49 percent to 54 percent. Hispanics and American Indians composed approximately 91 percent of the total minority population. This is commensurate with characteristics of the State of New Mexico. In the same decade, the percentage minority population of New Mexico increased from approximately 49 percent to 55 percent. As a percentage of the total population in 1990, New Mexico had the largest minority population among all of the contiguous states. That was also found to be the case in the year 2000.

**Figure E-4** shows the geographical distribution of minorities residing near LANL in 1990 using block group resolution. Shaded block groups shown in Figure E-4 indicate that the percentage minority population residing in those block groups exceeded that for the State of New Mexico as a whole and was more than twice the percentage minority population for the nation as a whole. **Figure E-5** shows the geographical distribution of the low-income population residing near LANL in 1990. In 1990, approximately 13 percent of the nation’s resident population reported incomes below the poverty threshold, and approximately 21 percent of New Mexico’s population was composed of low-income individuals. Shaded block groups in Figure E-5 indicate that the percentage low-income population residing in those block groups exceeded that for New Mexico as a whole and was more than twice the percentage low-income population for the nation as a whole.



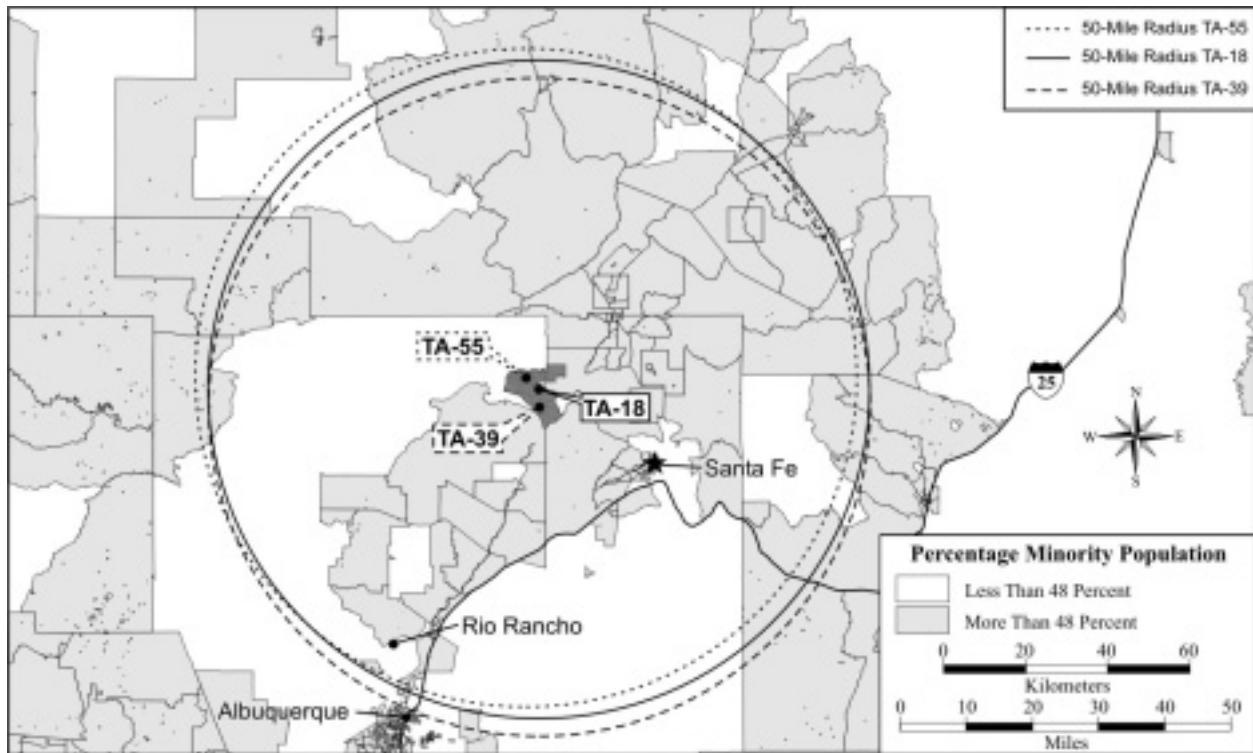


Figure E-4 Geographical Distribution of Minorities Residing near LANL

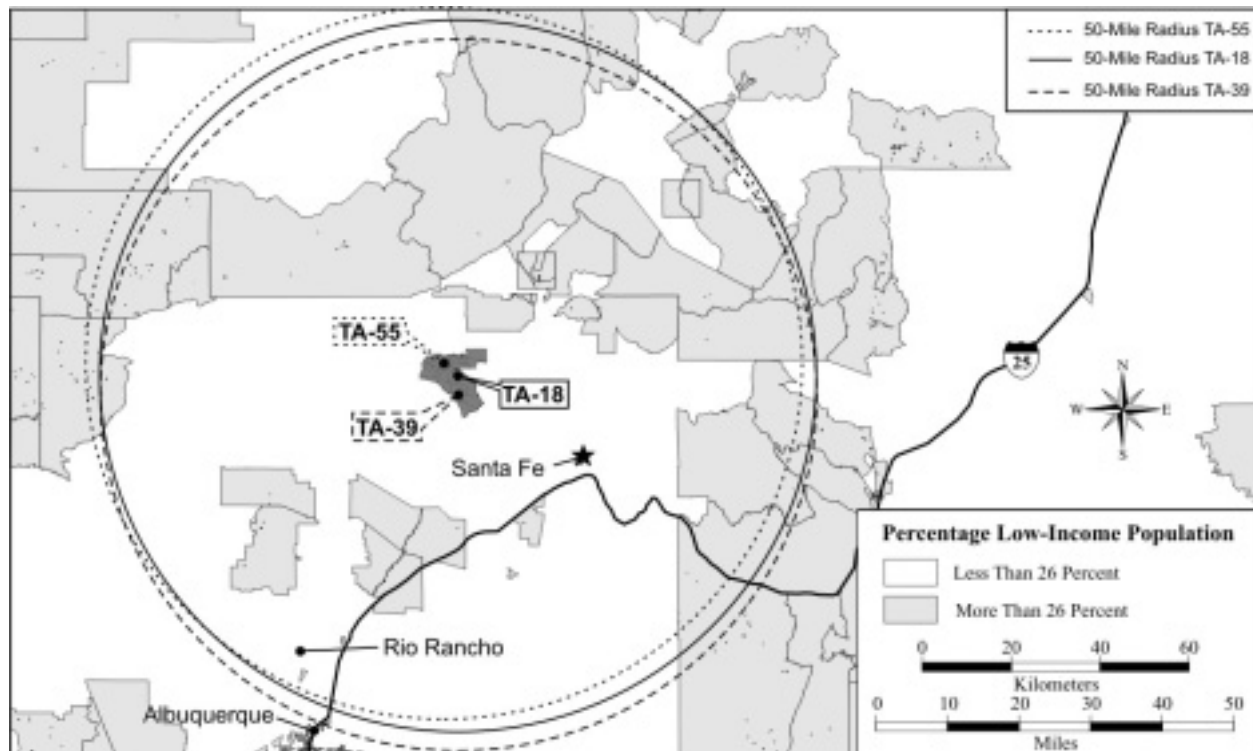


Figure E-5 Geographical Distribution of Low-Income Populations Residing near LANL

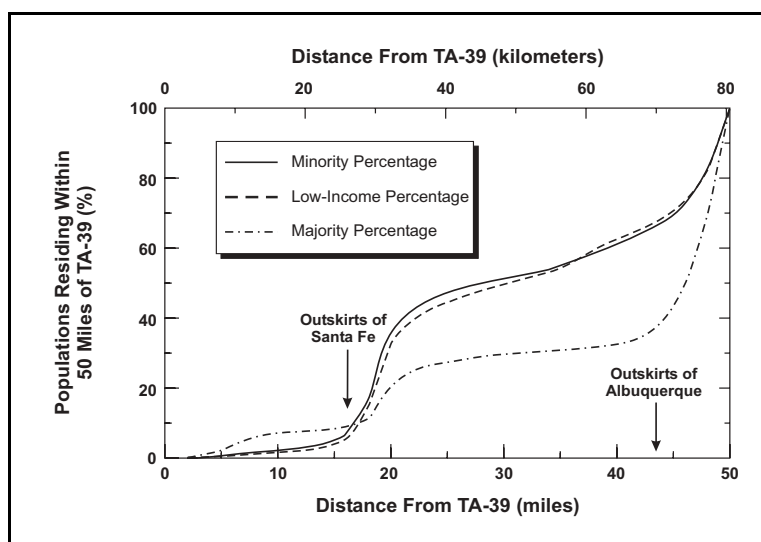
A total of approximately 156,350 minority individuals and 41,520 low-income persons resided within 80 kilometers (50 miles) of TA-39 in 1990. **Figure E-6** shows the cumulative percentage of these populations residing at a given distance from TA-39. For example, approximately 37 percent of the total minority population of 156,350 resided within 32 kilometers (20 miles) of TA-39, and approximately 33 percent of the total low-income population of 41,520 resided within 32 kilometers (20 miles) of TA-39. The curve representing percentages of minority residents (solid line in Figure E-6) is nearly identical in shape to that representing percentages of low-income residents (dashed line in Figure E-6). Both percentages rise sharply near the outskirts of the cities of Santa Fe and Albuquerque. Approximately 2 percent of the minority population (3,269 minority individuals) and 1.5 percent of the low-income population (615 low-income individuals) reside within 16 kilometers (10 miles) of TA-39. As indicated in the figure, the majority population (dot-dashed line in Figure E-6) residing within 80 kilometers (50 miles) of TA-39 was relatively concentrated in the cities of Santa Fe and Albuquerque in 1990. Low-income and minority residents were more noticeably distributed throughout the rural areas. As indicated by the similarities of the 80-kilometer (50-mile) bands shown in Figures E-4 and E-5, cumulative percentages of these populations for TA-18 and TA-55 are similar to those for TA-39.

### Impacts of Construction on Minority and Low-Income Populations

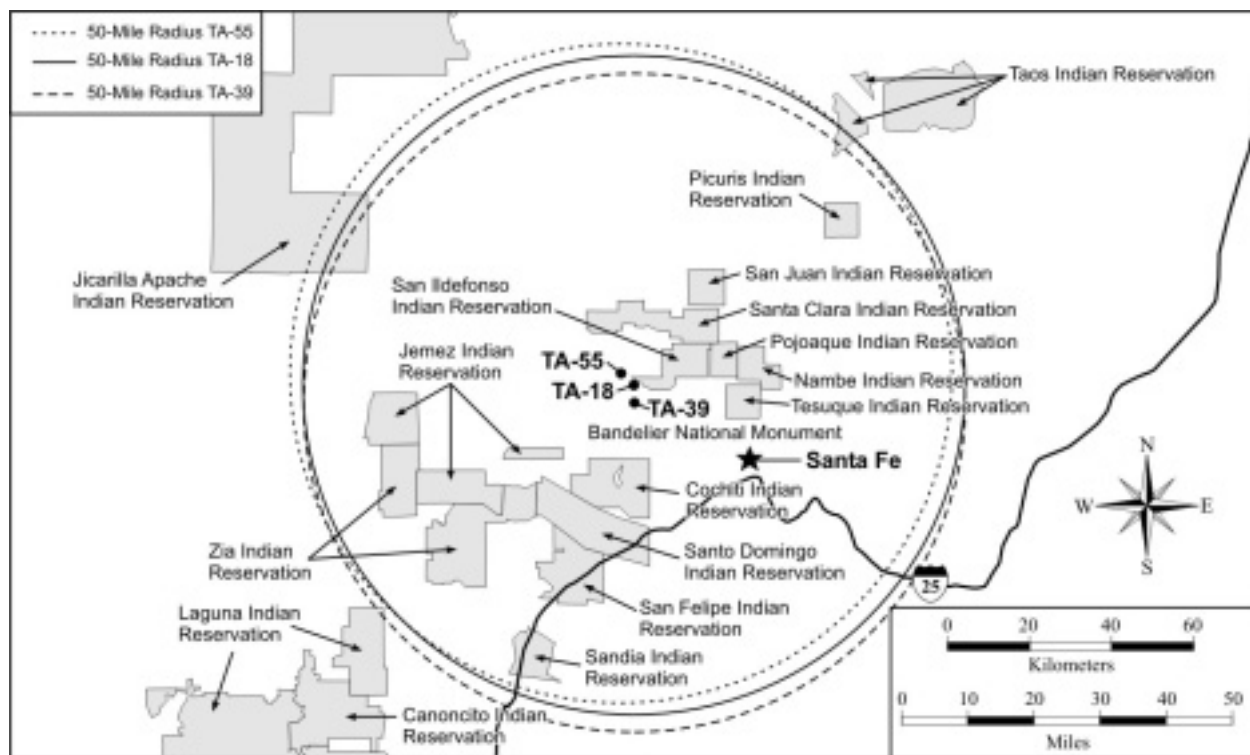
As discussed in Chapter 3, construction at LANL would occur under implementation of all of the alternatives except the No Action Alternative. As discussed throughout Section 5.2, construction impacts at LANL would be small and would not be expected to extend beyond the LANL boundary. Construction activities at LANL would have little or no impact on surrounding minority and low-income populations.

### Impacts of Normal Operations on Minority and Low-Income Populations

As discussed in Section 5.2.10.1, incident-free operations at LANL would result in the activation of from 10 curies to 110 curies of the radionuclide argon-41. Argon-41 is a colorless, inert gas with a half-life of approximately one hour and 48 minutes. The expected number of latent cancer fatalities among the general public surrounding LANL that would result from external exposure to argon-41 resulting from normal operations would be  $5 \times 10^{-5}$  or less. LANL is surrounded by Indian reservations that lie completely or partially within the area at radiological risk (see **Figure E-7**). Hence, subsistence consumption of radiologically-contaminated local crops and wildlife is a concern. However, argon-41 is a noble gas that decays into a stable isotope of potassium. No internal dose, either from ingestion or inhalation of argon-41, would result from normal operations at LANL. Therefore, normal operations would not pose a significant radiological risk to minority or low-income populations residing within the area at risk.



**Figure E-6 Cumulative Percentage of Populations Residing within 80 Kilometers (50 Miles) of TA-39**



**Figure E-7 Indian Reservations near LANL**

### Impacts of Accidents on Minority and Low-Income Populations

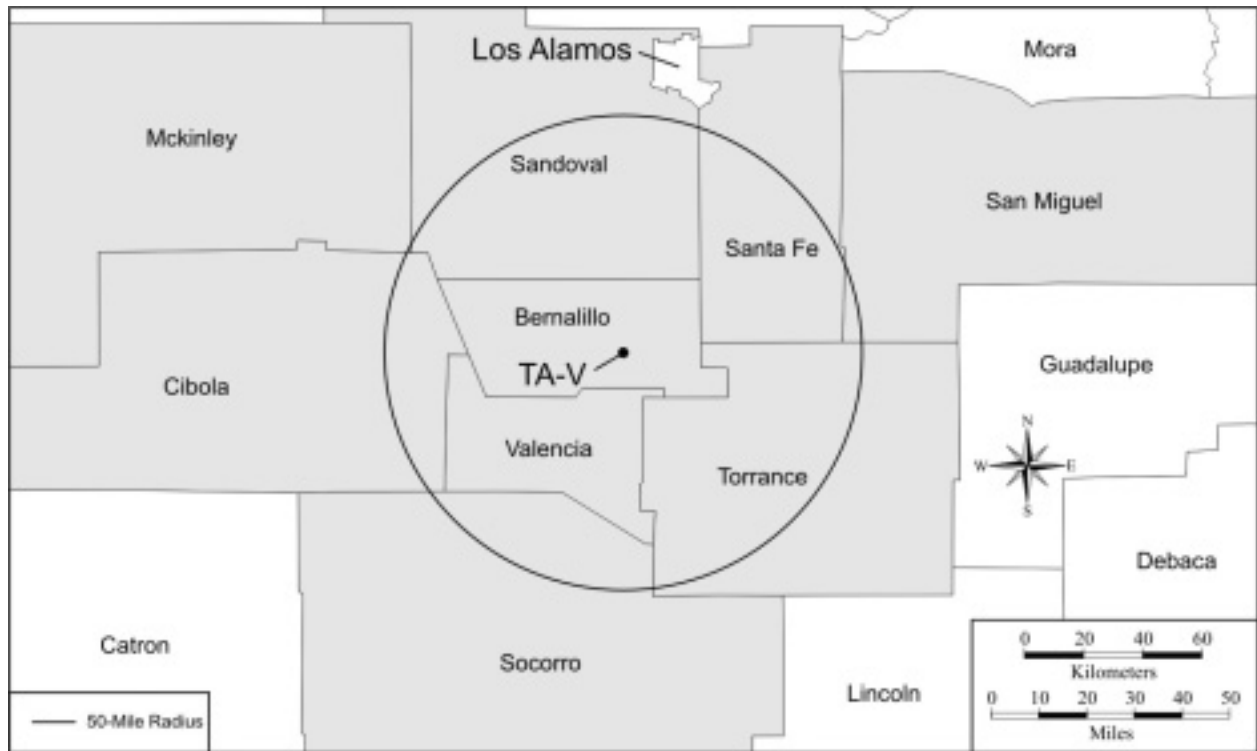
In terms of radiological risk, the most severe accident among those evaluated in this EIS would result in hydrogen denotation at SHEBA (Section 5.2.10.2 of Chapter 5). All accident risks to any member of the public are at least four orders of magnitude less than one latent cancer fatality. Hence, none of the postulated accidents would pose a significant radiological risk to the public, including minority and low-income individuals and groups within the population at risk.

As discussed in Section C.2 of Appendix C, consequences due to accidents were calculated with the MACCS2 Model. This model evaluates doses due to inhalation of aerosols, such as respirable plutonium, and exposure to the plume. Longer term effects including resuspension/inhalation and ingestion of contaminated crops, wildlife, and fish are not included in the calculation. Such effects are largely controllable through interdiction. In order to conservatively estimate the radiological dose due to inhalation, the deposition velocity was set equal to zero during the MACCS2 calculations. Radioactive materials that would be deposited on surfaces remained airborne and available for inhalation. Given the rarity of accidents that could impact offsite individuals and the conservatism in the calculations of inhaled dose, implementation of the No Action Alternative or of any of the other proposed alternatives, each of which involves construction and retention of all or some of the TA-18 activities at LANL, would not be expected to pose a significant radiological risk to low-income or minority populations residing near LANL, including low-income and minority groups that depend upon subsistence consumption of locally grown crops and wildlife.

### E.5.2 Sandia National Laboratories/New Mexico (SNL/NM)

Under the SNL/NM Alternative, security Category I/II activities currently conducted at TA-18 would be relocated to TA-V at SNL/NM. Security Category III/IV and SHEBA activities would remain at LANL. **Figure E-8** and **Table E-2** show the counties at radiological risk and the composition of the populations of

those counties, respectively. The counties are: Bernalillo, Cibola, McKinley, Sandoval, San Miguel, Santa Fe, Socorro, Torrance, and Valencia. Four of these counties (Bernalillo, Sandoval, Santa Fe, and San Miguel) would also be potentially affected by activities that would occur at LANL.



**Figure E-8 Potentially Affected Counties Surrounding SNL/NM**

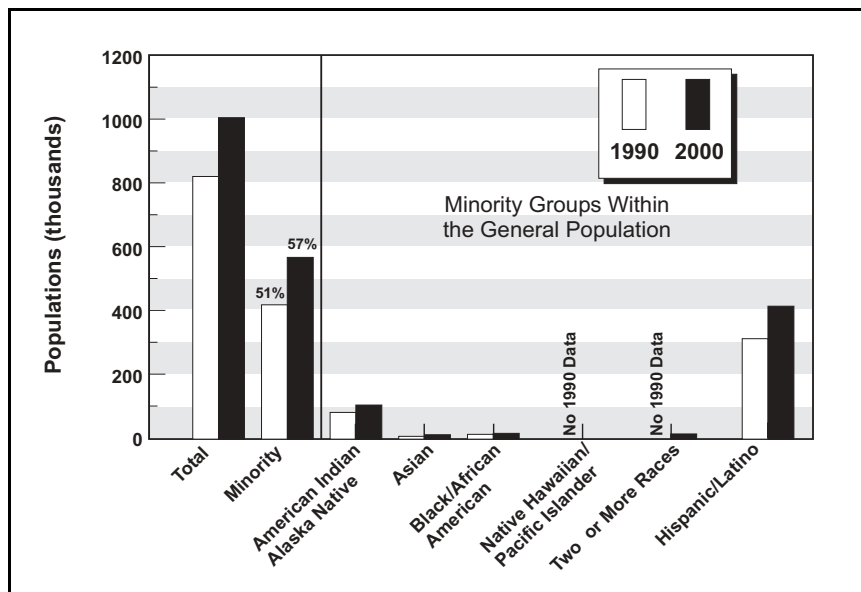
**Table E-2 Populations in Potentially Affected Counties Surrounding SNL/NM in 2000**

<i>Population Group</i>	<i>Population</i>	<i>Percentage of Total</i>
Total	1,007,538	100.0
Minority	569,428	56.5
Hispanic/Latino	416,189	41.3
Black/African American	17,533	1.7
American Indian/Alaska Native	106,093	10.5
Asian	13,213	1.3
Native Hawaiian/Pacific Islander	647	0.1
Two or more races	15,753	1.6
Some other race	1,644	0.2
White	436,466	43.3

Data shown in Table E-2 reflects the results of Census 2000. The Hispanic or Latino population shown in Table E-2 includes persons of any race who designated themselves as having Hispanic or Latino origins. Populations for each race shown in the last seven rows of Table E-2 did not characterize themselves as having Hispanic or Latino origins. As discussed in Section E.2 above, persons indicating that they were multiracial are included in the estimate of the minority population given in the second row of the table. Approximately two percent of the total U.S. population selected two or more races during Census 2000. Of those, approximately one-third selected “White” and “Some other race.” Since “White” and “Other race” are not included in the CEQ’s current definition of minority races (CEQ 1997), the minority population shown in Table E-2 is overestimated. However, since non-Hispanic persons in the group “Two or more

“races” were less than two percent of the total population of these counties in 2000, the overestimate is relatively small.

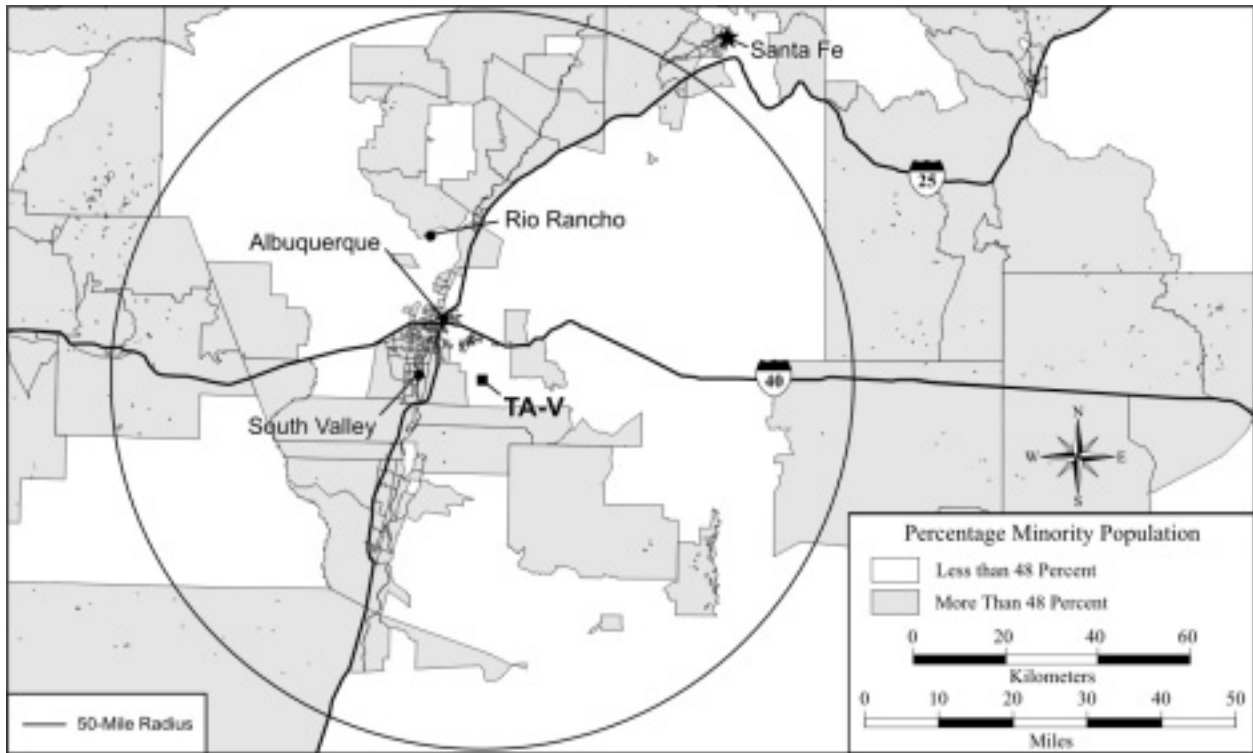
**Figure E-9** compares Census 2000 data with that for 1990 (to the extent that the data can be compared). There are several reasons that minority data from Census 1990 cannot be directly compared with Census 2000 data. During the 1990 Census, Asian and Pacific Islanders were counted together in a single category. However, during 2000 Census, “Native Hawaiian and Other Pacific Islander” and “Asian” were separate responses (selection of either one or both was an option). As a result, the 1990 population composed of Native Hawaiian and Other Pacific Islanders cannot be identified as a population distinct from Asians. In addition, during the 1990 Census, respondents were asked to designate themselves as members of only a single race. During Census 2000, respondents could select any combination of all of the six single race categories. As indicated in Figure E-9, there is no multiracial data available from the 1990 Census.



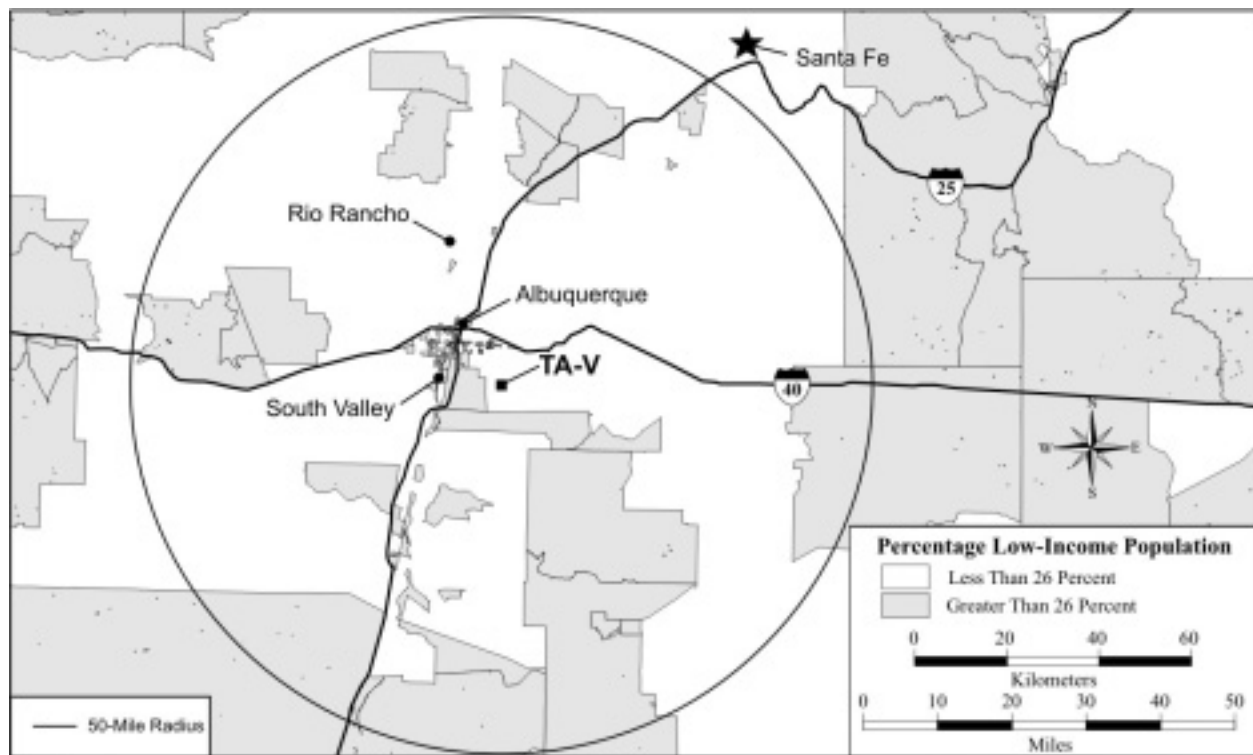
**Figure E-9 Comparison of Potentially Affected County Populations near SNL/NM in 1990 and 2000**

Bearing in mind the changes in racial categories and enumeration that occurred between the 1990 Census and Census 2000, the following approximate comparison can be made. In the decade from 1990 to 2000, the minority population in potentially affected counties increased from approximately 51 percent to 57 percent. Hispanics and American Indians composed approximately 92 percent of the total minority population. This is commensurate with characteristics of the State of New Mexico. In the same decade, the percentage minority population of New Mexico increased from approximately 49 percent to 55 percent. As a percentage of the total population in 1990, New Mexico had the largest minority population among all of the contiguous states. That was also found to be the case in the year 2000.

**Figure E-10** shows the geographical distribution of minorities residing near TA-V in 1990 using block group resolution. Shaded block groups shown in Figure E-10 indicate that the percentage minority population residing in those block groups exceeded that for the State of New Mexico as a whole and was more than twice the percentage minority population for the nation as a whole. **Figure E-11** shows the geographical distribution of the low-income population residing near TA-V in 1990. In 1990, approximately 13 percent of the nation’s resident population reported incomes below the poverty threshold, and approximately 21 percent of New Mexico’s population was composed of low-income individuals. Shaded block groups in Figure E-11 indicate that the percentage low-income population residing in those block groups exceeded that for New Mexico as a whole and was more than twice the percentage low-income population for the nation as a whole.

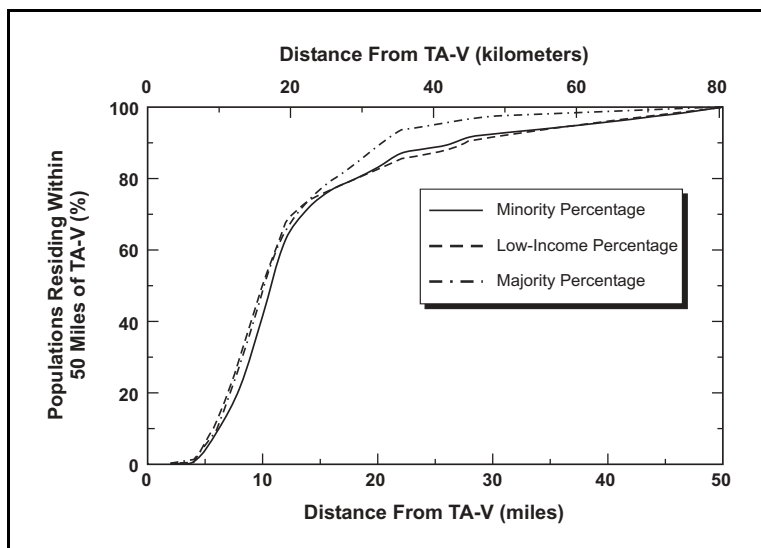


**Figure E-10 Geographical Distribution of Minority Populations Residing near TA-V**



**Figure E-11 Geographical Distribution of Low-Income Populations Residing near TA-V**

A total of approximately 273,569 minority individuals and 89,146 low-income persons resided within 80 kilometers (50 miles) of TA-V in 1990. **Figure E-12** shows the cumulative percentage of these populations residing at a given distance from TA-V. For example, approximately 83 percent of the total minority population of 273,569 resided within 32 kilometers (20 miles) of TA-V, and approximately 83 percent of the total low-income population of 89,146 resided within 20 miles of TA-39. The curve representing percentages of minority residents (solid line in Figure E-12) is nearly identical in shape to that representing percentages of low-income residents (dashed line in Figure E-12). All percentages rise sharply near the boundary of Kirtland Air Force Base. Approximately 43 percent of the minority population (113,502 minority individuals) and 49 percent of the low-income population (43,437 low-income individuals) reside within 16 kilometers (10 miles) of TA-V. All of the population groups represented in Figure E-12 are concentrated in the Albuquerque metropolitan area.



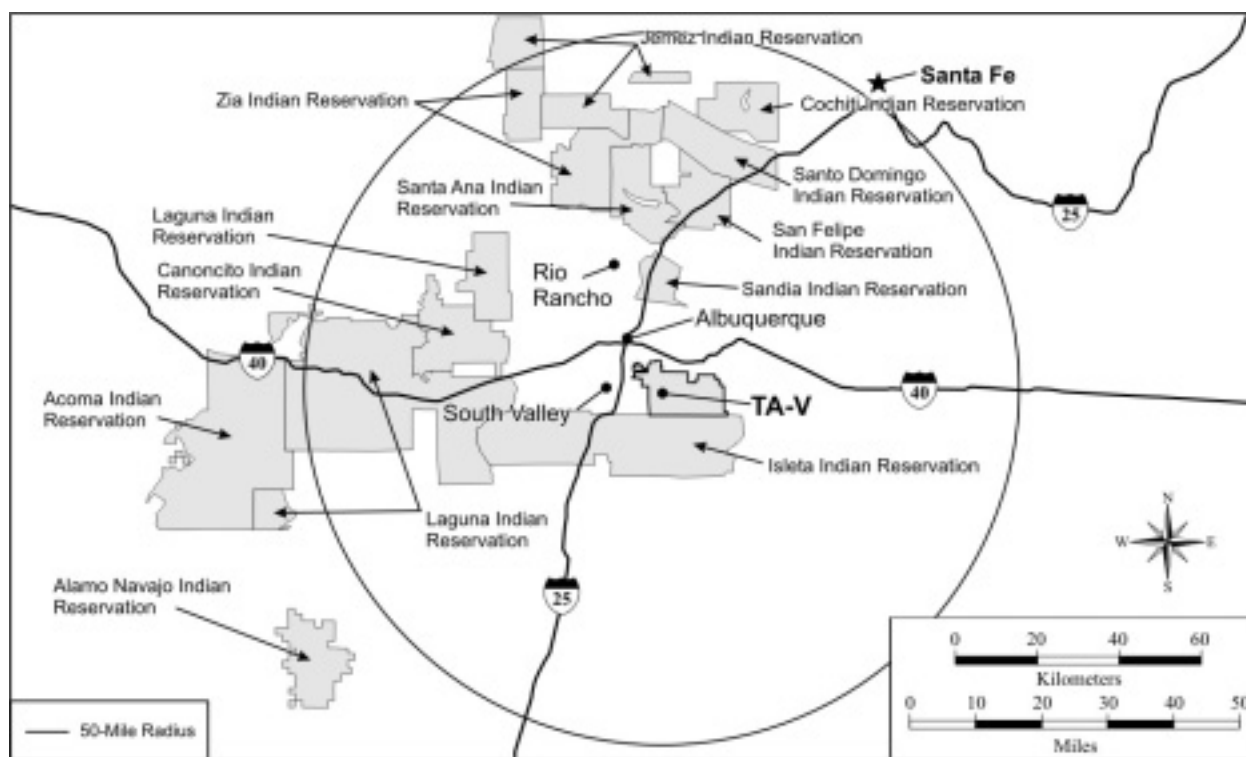
**Figure E-12 Cumulative Percentage of Populations Residing within 80 Kilometers (50 Miles) of TA-V**

### Impacts of Construction on Minority and Low-Income Populations

Construction of new facilities at TA-V would occur under implementation of the SNL/NM Alternative. As discussed throughout Section 5.3, construction impacts at TA-V would be small and would not be expected to extend beyond the boundary of Kirtland Air Force Base. Construction activities at TA-V would have little or no impact on the surrounding minority and low-income populations.

### Impacts of Normal Operations on Minority and Low-Income Populations

As discussed in Section 5.3.10.1, incident-free operations at TA-V would result in the activation of 10 curies per year of the radionuclide argon-41. Argon-41 is a colorless, inert gas with a half-life of approximately one hour and 48 minutes. The expected number of latent cancer fatalities that would result from external exposure to argon-41 among the general public surrounding SNL/NM would be approximately  $1 \times 10^{-5}$ . SNL/NM is surrounded by Indian reservations that lie completely or partially within the area at radiological risk (see **Figure E-13**). Hence, subsistence consumption of radiologically-contaminated local crops and wildlife is a concern. However, argon-41 is a noble gas that decays into a stable isotope of potassium. No internal dose, either from ingestion or inhalation of argon-41, would result from normal operations at TA-V. Therefore, normal operations conducted under the SNL/NM Alternative would not pose a significant radiological risk to resident minority or low-income populations.



**Figure E-13 Indian Reservations near TA-V**

### Impacts of Accidents on Minority and Low-Income Populations

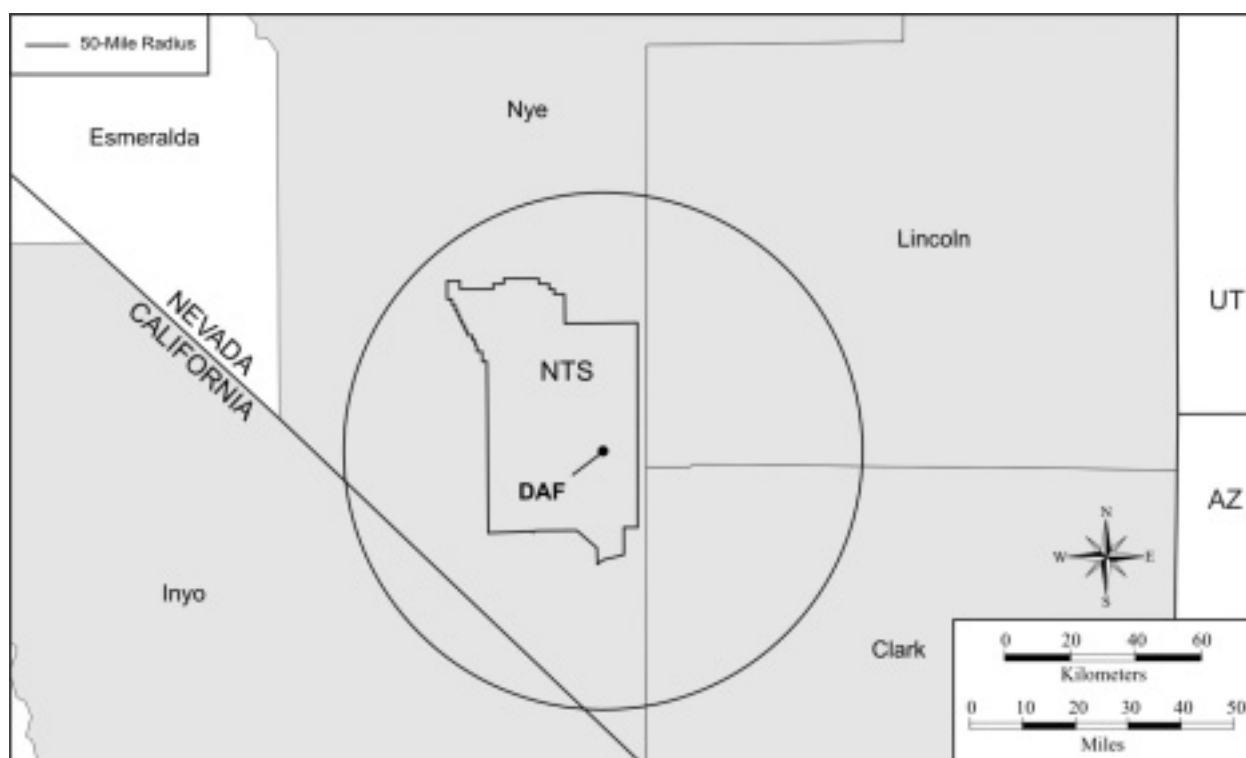
In terms of radiological consequences and risk to the offsite public, the most severe accident among those evaluated in this EIS would result in a high pressure spray fire at TA-V (Section 5.3.10.2 of Chapter 5). All accident risks to any member of the public are at least seven orders of magnitude less than one latent cancer fatality. Hence, none of the postulated accidents would pose a significant radiological risk to the public, including minority and low-income individuals and groups within the population at risk.

As discussed in Section C.2 of Appendix C, consequences due to accidents were calculated with the MACCS2 Model. This model evaluates doses due to inhalation of aerosols, such as respirable plutonium, and exposure to the plume. Longer term effects including resuspension/inhalation and ingestion of contaminated crops, wildlife, and fish are not included in the calculation. Such effects are largely controllable through interdiction. In order to conservatively estimate the radiological dose due to inhalation, the deposition velocity was set equal to zero during the MACCS2 calculations. Radioactive materials that would be deposited on surfaces remained airborne and available for inhalation. Given the rarity of accidents that could impact offsite individuals and the conservatism in the calculations of inhaled dose, implementation of the SNL/NM Alternative would not be expected to pose a significant radiological risk to resident low-income or minority populations, including low-income and minority groups that depend upon subsistence consumption of locally grown crops and wildlife.

### E.5.3 Nevada Test Site (NTS)

Under the NTS Alternative, security Category I/II activities currently conducted at TA-18 would be relocated to the Device Assembly Facility (DAF) at NTS. Security Category III/IV and SHEBA activities would remain at LANL. **Figure E-14** and **Table E-3** show the counties at radiological risk under implementation of the NTS Alternative and the composition of the population of these counties, respectively. The counties





**Figure E-14 Potentially Affected Counties near DAF**

in Nevada are: Clark, Lincoln, and Nye. A portion of Inyo County, California is also within the area of potential radiological effects.

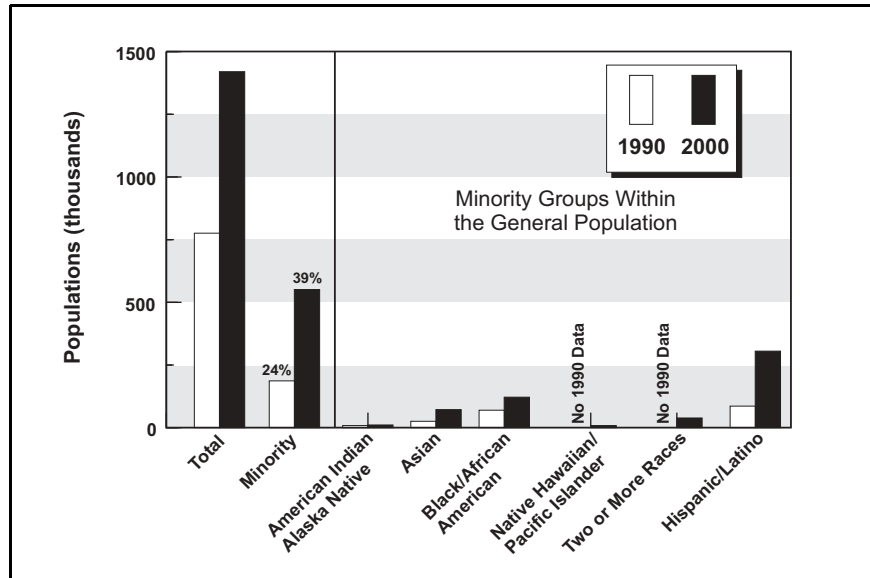
**Table E-3 Populations in Potentially Affected Counties Surrounding DAF in 2000**

<i>Population Group</i>	<i>Population</i>	<i>Percent of Total</i>
Total	1,430,360	100.0
Minority	554,986	38.8
Hispanic/Latino	307,334	21.5
Black/African American	121,865	8.5
American Indian/Alaska Native	10,092	0.7
Asian	71,639	5.0
Native Hawaiian/Pacific Islander	5,980	0.4
Two or more races	38,076	2.7
Some other race	2,133	0.1
White	873,241	61.1

Data shown in the Table E-3 reflects the results of Census 2000. The Hispanic or Latino population shown in Table E-3 includes persons of any race who designated themselves as having Hispanic or Latino origins. Populations for each race shown in the last seven rows of Table E-3 did not characterize themselves as having Hispanic or Latino origins. As discussed in Section E.2 above, persons indicating that they were multiracial are included in the estimate of the minority population given in the second row of the table. Approximately two percent of the total U.S. population selected two or more races during Census 2000. Of those, approximately one-third selected “White” and “Some other race.” Since “White” and “Other race” are not included in the CEQ’s current definition of minority races (CEQ 1997), the minority population shown in Table E-3 is overestimated. However, since non-Hispanic persons in the group “Two or more

“races” were less than three percent of the total population of these counties in 2000, the overestimate is relatively small.

**Figure E–15** compares Census 2000 data with that for 1990 (to the extent that the data can be compared). There are several reasons that minority data from Census 1990 cannot be directly compared with Census 2000 data. During the 1990 Census, Asian and Pacific Islanders were counted together in a single category. However, during Census 2000, “Native Hawaiian and Other Pacific Islander” and “Asian” were separate responses (selection of either one or both was an option). As a result, the 1990 population composed of Native Hawaiian and Other Pacific Islanders cannot be identified as a population distinct from Asians. In addition, during the 1990 Census, respondents were asked to designate themselves as members of only a single race. During Census 2000, respondents could select any combination of all of the six single race categories. As indicated in Figure E–15, there is no multiracial data available from the 1990 Census.



**Figure E–15 Comparison of Potentially Affected County Populations near DAF in 1990 and 2000**

Bearing in mind the changes in racial categories and enumeration that occurred between the 1990 Census and the 2000 Census, the following approximate comparison can be made. In the decade from 1990 to 2000, Nevada was the fastest growing state in the U.S. The minority population in potentially affected counties increased from approximately 24 percent to 39 percent. The Hispanic or Latino population of these counties more than tripled during the past decade, and the Asian population of those counties nearly tripled during the same decade. Nearly 70 percent of the population of the State of Nevada was found to reside in the Las Vegas metropolitan area of Clark County during Census 2000. Populations shown in Figure E–15 largely reflect the racial and Hispanic composition of Clark County.

**Figure E–16** shows the geographical distribution of minorities residing near the DAF in 1990 using block group resolution. Shaded block groups shown in Figure E–16 indicate that the percentage minority population residing in those block groups exceeded that for the nation and State of Nevada as a whole. **Figure E–17** shows the geographical distribution of the low-income population residing near the DAF. In 1990, approximately 13 percent of the nation’s resident population reported incomes below the poverty threshold, and approximately 10 percent of Nevada’s population was composed of low-income individuals. Shaded block groups in Figure E–17 indicate that the percentage low-income population residing in those block groups was more than national and state percentages of low-income residents.

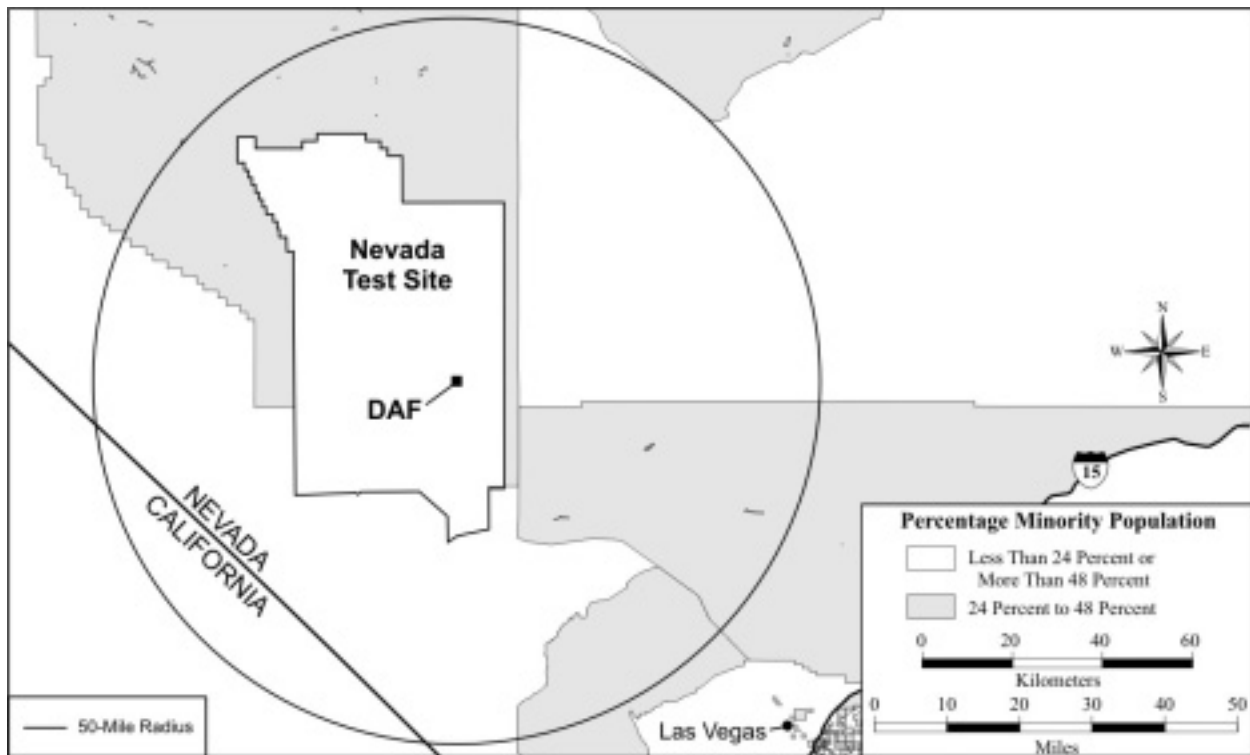


Figure E-16 Geographical Distribution of the Minority Population Residing near the DAF

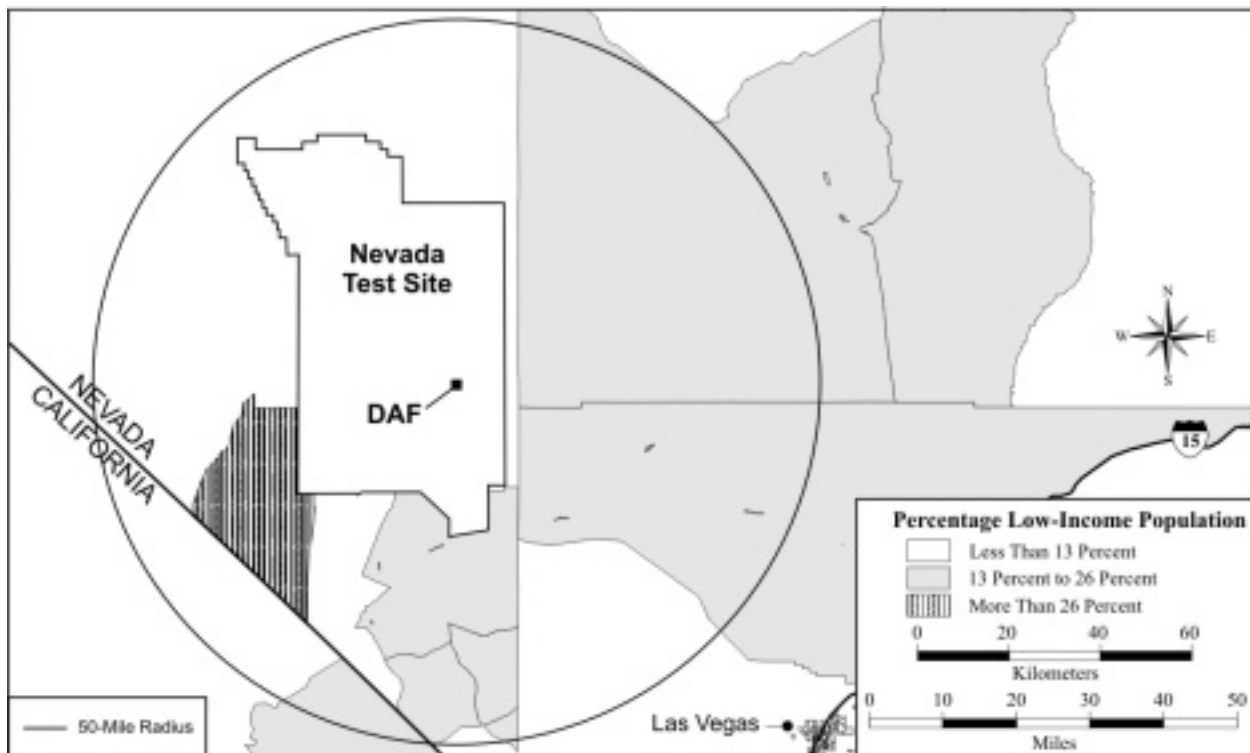
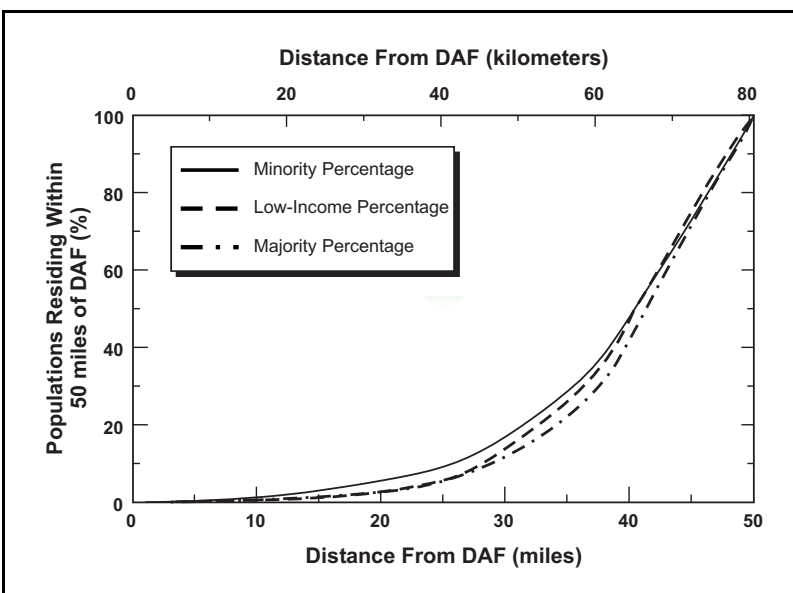


Figure E-17 Geographical Distribution of the Low-Income Population Residing near the DAF

Approximately 1,710 minority individuals and 1,345 low-income persons resided within 80 kilometers (50 miles) of the DAF in 1990. **Figure E-18** shows the cumulative percentage of these populations residing at a given distance from the DAF. For example, approximately 6 percent of the total minority population of 1,710 resided within 32 kilometers (20 miles) of DAF, and approximately 3 percent of the total low-income population of 1,345 resided within 32 kilometers (20 miles) of DAF. Curves representing potentially affected minority (solid line), low-income (dashed line), and majority populations (dot-dash line) in Figure E-18 are



**Figure E-18 Cumulative Percentage Population Residing within 80 Kilometers (50 Miles) of DAF**

similar in shape. There are no major metropolitan areas in the potentially affected area. All three curves increase at approximately the same rate as the distance approaches that for the Las Vegas metropolitan area.

### Impacts of Construction on Minority and Low-Income Populations

Construction of new facilities at the DAF would occur under implementation of the NTS Alternative. As discussed throughout Section 5.4, construction impacts at the DAF would be small and would not be expected to extend beyond the boundary of NTS. Construction activities at the DAF would have little or no impact on the surrounding minority and low-income populations.

### Impacts of Normal Operations on Minority and Low-Income Populations

As discussed in Section 5.4.10.1, incident-free operations at DAF would result in the activation of 10 curies per year of the radionuclide argon-41. Argon-41 is a colorless, inert gas with a half-life of approximately one hour and 48 minutes. The expected number of latent cancer fatalities that would result from external exposure to argon-41 among the general public surrounding NTS would be approximately  $4 \times 10^{-8}$ . No internal dose, either from ingestion or inhalation of argon-41, would result from normal operations at DAF. Therefore, normal operations conducted under the NTS Alternative would not pose a significant radiological risk to resident minority or low-income populations.

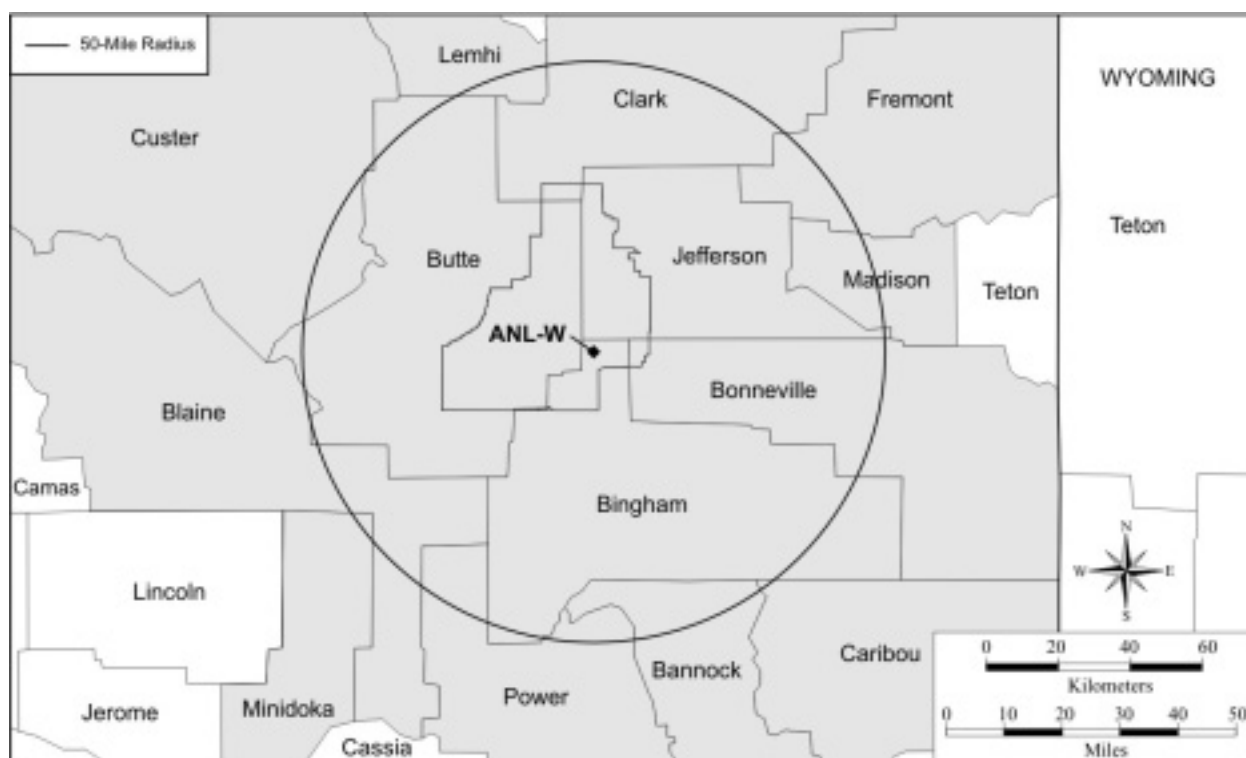
### Impacts of Accidents on Minority and Low-Income Populations

In terms of radiological consequences and risk to the offsite population, the most severe accident among those evaluated in this EIS would result in a high pressure spray fire at DAF (Section 5.4.10.2 of Chapter 5). All accident risks to any member of the public are essentially zero. Hence, none of the postulated accidents would pose a significant radiological risk to the public, including minority and low-income individuals and groups within the population at risk.

As discussed in Section C.2 of Appendix C, consequences due to accidents were calculated with the MACCS2 Model. This model evaluates doses due to inhalation of aerosols, such as respirable plutonium, and exposure to the plume. Longer term effects including resuspension/inhalation and ingestion of contaminated crops, wildlife, and fish are not included in the calculation. Such effects are largely controllable through interdiction. In order to conservatively estimate the radiological dose due to inhalation, the deposition velocity was set equal to zero during the MACCS2 calculations. Radioactive materials that would be deposited on surfaces remained airborne and available for inhalation. Given the rarity of accidents that could impact offsite individuals and the conservatism in the calculations of inhaled dose, implementation of the NTS Alternative would not be expected to pose a significant radiological risk to resident low-income or minority populations, including low-income and minority groups that depend upon subsistence consumption of locally grown crops and wildlife.

#### E.5.4 Argonne National Laboratory-West (ANL-W)

Under the ANL-W Alternative, security Category I/II activities currently conducted at TA-18 would be relocated to the vicinity of the Fuel Manufacturing Facility (FMF) and its environs at ANL-W. Security Category III/IV activities would remain at LANL. **Figure E-19** and **Table E-4** show the counties at radiological risk and the composition of the populations of these counties, respectively. The counties are: Bannock, Bingham, Blaine, Bonneville, Butte, Clark, Caribou, Custer, Fremont, Jefferson, Lemhi, Madison, Minidoka, and Power.



**Figure E-19 Potentially Affected Counties near ANL-W**

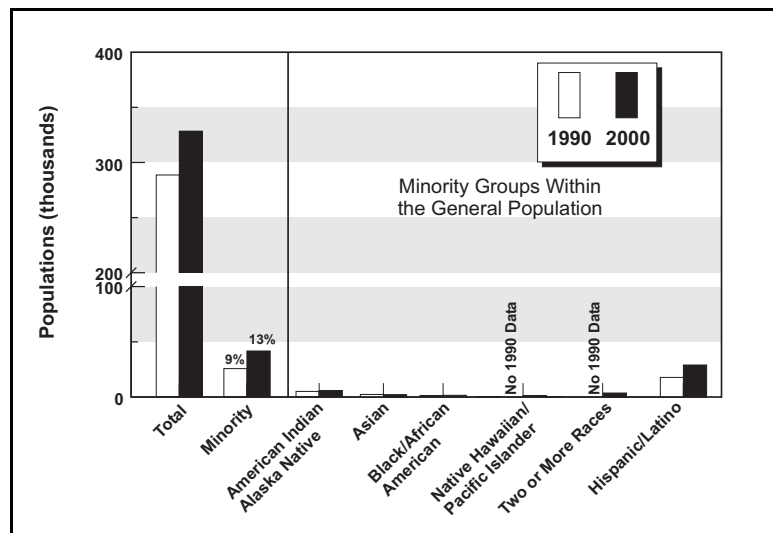
Data shown in Table E-4 reflects the results of Census 2000. The Hispanic or Latino population shown in Table E-4 includes persons of any race who designated themselves as having Hispanic or Latino origins. Populations for each race shown in the last seven rows of Table E-4 did not characterize themselves as having Hispanic or Latino origins. As discussed in Section E.2 above, persons indicating that they were multiracial are included in the estimate of the minority population given in the second row of the table.

Approximately two percent of the total U.S. population selected two or more races during the 2000 Census. Of those, approximately one-third selected “White” and “Some Other Race.” Since “White” and “Other Race” are not included in the CEQ’s current definition of minority races (CEQ 1997), the minority population shown in Table E-4 is overestimated. However, since non-Hispanic persons in the group “Two or More Races” were less than 2 percent of the total population of these counties in 2000, the overestimate is relatively small.

**Table E-4 Populations in Potentially Affected Counties Surrounding ANL-W in 2000**

<i>Population Group</i>	<i>Population</i>	<i>Percentage of Total</i>
Total	328,339	100.0
Minority	41,547	12.7
Hispanic/Latino	28,950	8.8
Black/African American	990	0.3
American Indian/Alaska Native	5,702	1.7
Asian	2,125	0.6
Native Hawaiian/Pacific Islander	277	0.1
Two or more races	3,503	1.1
Some other race	225	0.1
White	286,567	87.3

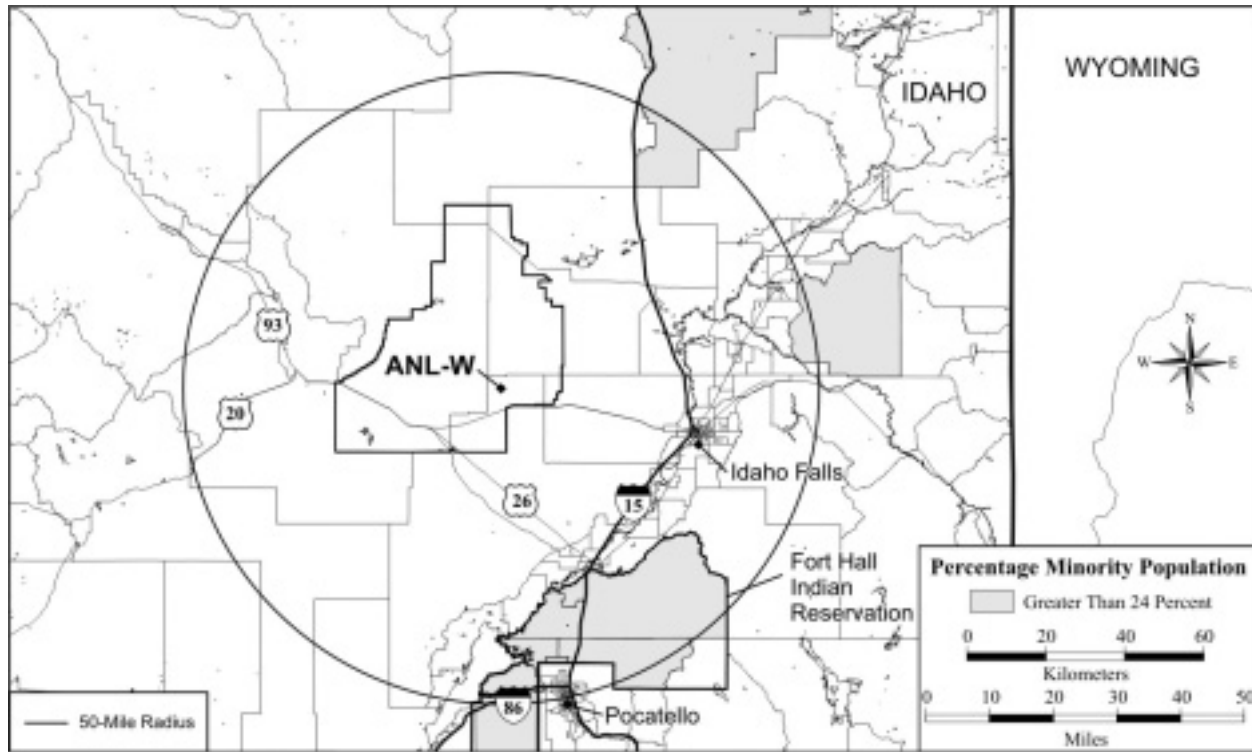
**Figure E-20** compares the 2000 Census data with that for 1990 (to the extent that the data can be compared). There are several reasons that minority data from Census 1990 cannot be directly compared with Census 2000 data. During the 1990 Census, Asian and Pacific Islanders were counted together in a single category. However, during Census 2000, “Native Hawaiian and Other Pacific Islander” and “Asian” were separate responses (selection of either one or both was an option). As a result, the 1990 population composed of Native Hawaiian and Other Pacific Islanders cannot be identified as a population distinct from Asians. In addition, during the 1990 Census, respondents were asked to designate themselves as members of only a single race. During Census 2000, respondents could select any combination of all of the six single race categories. As indicated in Figure E-20, there is no multiracial data available from the 1990 Census.



**Figure E-20 Comparison of Potentially Affected County Populations near ANL-W in 1990 and 2000**

Bearing in mind the changes in racial categories and enumeration that occurred between the 1990 Census and Census 2000, the following approximate comparison can be made. In the decade from 1990 to 2000, the minority population in potentially affected counties increased from approximately 9 percent to 13 percent. This is commensurate with characteristics of the State of Idaho. In the same decade, the percentage minority population of Idaho increased from approximately 8 percent to 12 percent.

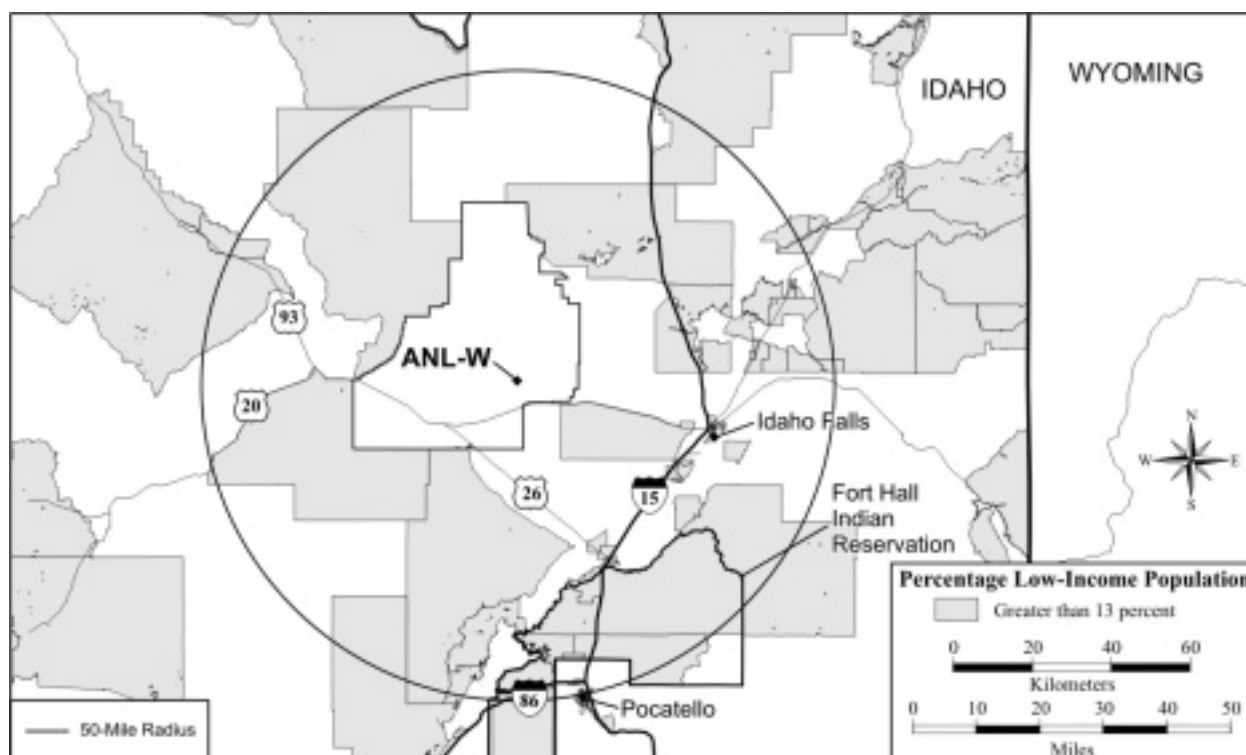
**Figure E-21** shows the geographical distribution of minorities residing near ANL-W in 1990 using block group resolution. Shaded block groups shown in Figure E-21 indicate that the percentage minority population residing in those block groups exceeded that for the nation as a whole and was more than three times the percentage minority population for the State of Idaho.



**Figure E-21 Geographical Distribution of Minorities Residing near ANL-W**

**Figure E-22** shows the geographical distribution of the low-income population residing near ANL-W in 1990. In 1990, approximately 13 percent of the nation's resident population reported incomes below the poverty threshold, and approximately 13 percent of Idaho's population was composed of low-income individuals. Shaded block groups in Figure E-22 indicate that the percentage low-income population residing in those block groups exceeded that for Idaho and the nation.

A total of approximately 15,691 minority individuals and 25,045 low-income persons resided within 80 kilometers (50 miles) of ANL-W in 1990. **Figure E-23** shows the cumulative percentage of these populations residing at a given distance from ANL-W. For example, approximately 2 percent of the total minority population and approximately 1.5 percent of the total low-income population resided within 32 kilometers (20 miles) of FMF. The curve representing percentages of minority residents (solid line in Figure E-23) increases steadily throughout the potentially affected area. The percentage of low-income residents (dashed line) and majority residents (dot-dash line) rise sharply near the outskirts of the cities of Idaho Falls and Pocatello. Less than 1 percent of the minority population (92 minority individuals) and low-income population (70 low-income individuals) reside within 16 kilometers (10 miles) of FMF.



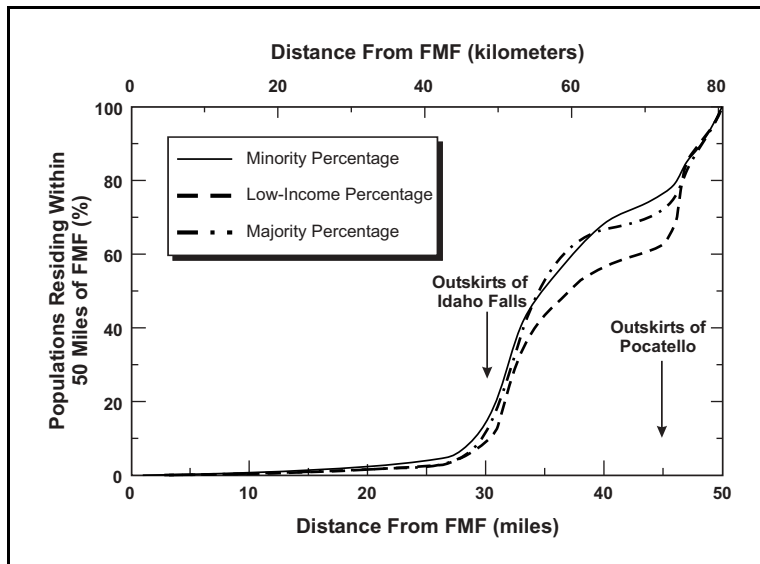
**Figure E-22 Geographical Distribution of Low-Income Populations Residing near ANL-W**

### Impacts of Construction on Minority and Low-Income Populations

Modification of existing facilities and construction of new facilities at ANL-W would occur under implementation of this alternative. As discussed throughout Section 5.5, construction impacts at ANL-W would be small. Construction activities at ANL-W would have little or no impact on the surrounding minority and low-income populations.

### Impacts of Normal Operations on Minority and Low-Income Populations

As discussed in Section 5.5.10.1, incident-free operations at FMF would result in the activation of 10 curies per year of the radionuclide argon-41. Argon-41 is a colorless, inert gas with a half-life of approximately one hour and 48 minutes. The expected number of latent cancer fatalities that would result from external exposure to argon-41 among the general public surrounding ANL-W would be approximately  $2 \times 10^{-7}$ . No internal dose, either from ingestion or inhalation of argon-41, would result from normal operations at FMF. Therefore, normal operations



**Figure E-23 Cumulative Percentage of Populations Residing within 80 Kilometers (50 Miles) of FMF**



conducted under the ANL-W Alternative would not pose a significant radiological risk to resident minority or low-income populations.

### **Impacts of Accidents on Minority and Low-Income Populations**

In terms of radiological consequences and risk, the most severe accident among those evaluated in this EIS would result in a high pressure spray fire at FMF (Section 5.5.10.2 of Chapter 5). All accident risks to any member of the public are essentially zero. Hence, none of the postulated accidents would pose a significant radiological risk to the public, including minority and low-income individuals and groups within the population at risk.

As discussed in Section C.2 of Appendix C, consequences due to accidents were calculated with the MACCS2 Model. This model evaluates doses due to inhalation of aerosols, such as respirable plutonium, and exposure to the plume. Longer term effects including resuspension/inhalation and ingestion of contaminated crops, wildlife, and fish are not included in the calculation. Such effects are largely controllable through interdiction. In order to conservatively estimate the radiological dose due to inhalation, the deposition velocity was set equal to zero during the MACCS2 calculations. Radioactive materials that would be deposited on surfaces remained airborne and available for inhalation. Given the rarity of accidents that could impact offsite individuals and the conservatism in the calculations of inhaled dose, implementation of the ANL-W Alternative would not be expected to pose a significant radiological risk to resident low-income or minority populations, including low-income and minority groups that depend upon subsistence consumption of locally grown crops and wildlife.

## E.6 REFERENCES

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